252278

COMMONWEALTH OF AUSTRALIA.

PATENT SPECIFICATION

3996/61

Complete Specification Lodged ..... 27th April, 1961.

Application Lodged(No. 3996/61) ..... 27th April, 1961.

Applicant.....The British Plaster Board (Holdings) Limited.

Actual Inventor..... Gerald Waterworth Cafferata.

Convention Application.
(Great Britain, 29th April, 1960, No. 15, 238/60 and 1st September, 1960, No. 30, 205/60).

Complete Specification Published ..... 2nd May, 1963.

Complete Specification Accepted ..... 8th June, 1964.

Classification 81.3.
International Classification E 04 b.
Drawings (4 sheets) attached.

COMPLETE SPECIFICATION.

JOINTING OF BUILDING BOARDS IN DRY WALL OR OTHER CONSTRUCTIONS.

The following statement is a full description of this invention, including the best method of performing it known to us:-

The present invention relates to the construction of walls, partitions, ceilings and like structures from plasterboard, fibreboard and like building boards and is concerned with the preparation of joints between adjacent boards. The invention is of value in the construction of partitions and wall linings by so-called "dry wall" methods.

In the construction of walls and like structures it is frequently desirable, for the purposes of subsequent decoration, that the finished structure should present a smooth, unbroken surface, and various procedures for achieving this have previously been proposed or practised. According to one procedure the joint is covered by a taper-edged tape, secured by adhesive material, but the ridges arising from this procedure can appear prominent, especially under glancing illumination.

Plasterboard for example has been produced with recessed or tapered longitudinal edges, the shallow recess formed by cooperation of the rebates or tapers at the edges of two adjacent boards being filled with a joint-filling material such as plaster to form a flush joint. Recessed-edge board suffers from the disadvantage that the face paper is liable to become damaged at the edge of the rebate and, by allowing water to penetrate the paper layer when the joint is plastered, to give rise to lifting of the paper and formation of ridges. Taper-edged board gives rise to difficulties of uneven drying in the production of the

boards, owing to the variation in thickness of the plaster between the edge and the middle, and the extent of taper is limited in that the boards cannot be made less than about $\frac{1}{4}$ inch thick at the extreme edge, since with thinner edges there is a risk of "burning" or dehydration of the plaster core at the edges during drying, thereby weakening the said edges and so rendering the board susceptible to damage during handling and erection. Moreover, as plasterboard is usually produced in strip form by a continuous process, only the longitudinal edges of the boards can be recessed or tapered, since the lateral edges of the individual boards are produced by cutting the strip. It is therefore possible with these forms of board to flush-joint only the horizontal or the vertical joints in, say, a wall, but not joints in both directions.

A more serious disadvantage is that taper-edged or recessed-edge boards allow only a limited thickness of plaster over the line of junction, whether the joint is merely to be filled flush with the face of the boards or the whole face of the boards is to be covered by a skim coating. It has now been found that an insufficient thickness of plaster is a primary cause of cracking of the plaster along the joint, and that a thickness of at least 1/8 inch is necessary to minimise this. Thicknesses of $\frac{1}{4}$ inch or more are preferable, and these cannot normally be obtained with tapered or recessed boards. Furthermore, when there is an inadequate thickness of plaster or other jointing material over the gap between the boards it sometimes happens that, owing to the expansion of the plug of plaster filling the gap, a faintly raised ridge appears immediately over the gap after the finishing operation, and this ridge cannot be hidden merely by decoration.

The present invention provides a method of producing a joint between two adjacent substantially coplanar building boards, wherein an edge portion of each of the two boards is bent back from the plane of the face of the board and retained in the bent position, the edge being at least 1/8 inch behind the said plane, and with the boards mounted in their coplanar position with the free edges of the bent portions parallel and adjacent, the recess afforded by the bending back of the edge portions is filled with a hardenable jointing material, for example gypsum plaster, bridging the gap if any between the said edges and forming a substantially plane surface across the joint. The jointing material should be reinforced with a layer of cotton bandage, jute or metal scrim or the like, perforated thin metal strip or other web material. If the recess is deep, a double thickness of two distinct layers of reinforcing web may be used.

If a flush joint is required, as in dry wall construction, the jointing material should be formed to provide a surface substantially coplanar with the faces of the boards. The method may also be applied to boards to be skimmed with plaster, in which case the skim coat will provide a continuous plane surface of plaster with an increased depth of plaster over the joint.

The bending back of the edge portions of the boards will normally be carried out on the building site, and if the boards are to be fixed to shaped supports which determine the profile of the mounted board, for example by nailing to timber joists, battens or "studding", the bending may be effected during the operation of fixing the boards in the coplanar position. If the boards are to be mounted by means which do not determine the shape of the board, for example by impression into ribbons of a hardenable bonding material such as a gypsum plaster slurry, the edge portions may be bent back before mounting and retained by the application to the boards of a hardenable fixative, for which purpose also a gypsum plaster slurry may be used.

It is important, for satisfactory behaviour of the wall or like surface in use, that the face paper should be undamaged. The face paper of plasterboard has much greater dimensional stability in the longitudinal direction, and thus, although bending of the longitudinal

edges of plasterboard is relatively easy and incurs little risk of damage to the paper (which is bent in its lateral direction), bending of the board along its lateral, cut, edges is more difficult, and it is usually advantageous to score or groove the board at the back to facilitate bending and to prevent excessive stretching of the face paper in its longitudinal direction.

An advantage of the present invention is that it permits the production of sound flush-jointed constructions from standard "square edge" plasterboard, and moreover permits the flush-jointing of all edges of the individual boards. The invention avoids the above-mentioned disadvantages of recessed- and taper-edged boards and avoids the necessity of providing storage for large additional stocks of these specially shaped boards.

A more important advantage is that the invention permits the construction of joints having a sufficient thickness of plaster to avoid cracking along the line of the joint. Plasterboard can be bent to a considerable extent without damage to the face paper, and the necessary 1/8 inch deflection can be readily achieved. The depth of the recess at the joint can if desired be made greater than the thickness of the board itself provided the width of the recess is extended to allow the necessary degree of bending. For example, for unscored boards a finished joint width of 10 to 12 inches should be allowed for a deflection of 3/8 inch, and 6 to 8 inches for a deflection of $\frac{1}{4}$ inch.

In constructions other than "dry wall", where the surface of the boards is covered with a skim coating of plaster, insufficient thickness of plaster over the joint can also give rise to cracking along the joint. Even a nominal 3/16 inch skim coat may easily fall below the minimum safe thickness over the joints particularly where unseasoned timber is used. The method of the invention can therefore assist in providing improved joints in this type of construction, by affording increased thickness of plaster over the joints, yet still presenting a flat finished surface.

An additional advantage over taper-edged board is that bending back of a conventional "square-edged" board results in a face which passes continuously from the flat surface of the greater part of the board into a curved surface of the bent edge-portion. Taper-edged board, on the other hand, exhibits a sharp line of demarcation between the flat surface and the tapered surface, and this line causes difficulties in plastering to a smooth finish.

An interesting application of the invention is in the jointing of abutting hollow panels or partition members of the type which consists of a pair of parallel plasterboard facing boards separated and connected by a cellular core consisting of crossing sets of flat strips, for example of kraft paper, arranged edgewise between the boards and secured to the facing boards with an adhesive such as sodium silicate or synthetic resin. Adjacent panels can be joined by means of a junction batten, or, preferably, by the use of jointing members extending transversely to the line of junction.

The invention will be further described by reference to a number of examples of its application as illustrated by the accompanying drawings in which corresponding items are indicated by reference numerals throughout. In the drawings:

Fig. 1 is a vertical section through a ceiling with joints constructed according to the invention;

Fig. 2 is a vertical section through a second form of ceiling;

Fig. 3 is a vertical section through a third form of ceiling constructed according to the invention;

Fig. 4 is a vertical section through one form of double-faced stud partition with horizontal joints;

Fig. 5 is a horizontal section through a double-faced stud partition with vertical joints;

Fig. 6 is a horizontal section through a second form of double-faced stud partition with vertical joints;

Fig. 7 is a horizontal section through a third form of partition with metal studding;

Fig. 8 is a vertical section through a furred wall structure with horizontal joints;

Fig. 9 is a horizontal section through a wall-surface structure with vertical joints;

Fig. 10 is a horizontal section through a second form of wall-surface structure with vertical joints;

Fig. 11 is a horizontal section through a third form of wall-surface structure;

Fig. 12 is a horizontal section through a double-faced partition in the region of a vertical joint between two double-faced units;

Fig. 13 is a horizontal section through a double-faced partition showing a different method of constructing a vertical joint between two units; and

Fig. 14 is a horizontal section through a partition showing a third method of constructing a vertical joint.

In the construction of one form of ceiling building boards 20 are fixed to a series of horizontal timber joists 30, usually by nailing. One method of constructing a flush joint according to the invention is shown in Fig. 1 and consists in cutting shallow, wide-angle, vee-notches 22 at least 1/8 inch in depth in the faces of a series of adjacent joists 30 (only one of which appears in Fig. 1) at the position of the intended joint, applying two plasterboards 20 against the joists, one each side of the centre line of the vee-notches, with or without a small gap between the adjacent edges of the boards, nailing the greater part of the board to the face of the joists by means of nails 23 and thereafter driving nails 24 through the adjacent edge portions into the respective sides of the vee-notches. By this action the edges of the boards 20 are bent back at least 1/8 inch to conform to the profile of the sides of the vee-notches. Finely ground gypsum plaster slurry 25 is then applied to the now recessed adjacent edges of the boards to fill the small gap if any between them, and a narrow length of cotton bandage or scrim 26 is then laid along the recessed portion of the boards and bedded into the initially applied layer of plaster. Finally, the recess is filled with finely ground plaster slurry, the surface of which is smoothed to form a joint having a surface flush with the faces of the two boards. It is preferable that the heads of the nails 23 should be recessed, for example by the use of a tool with a rounded tip, and the recess filled with plaster 51.

An alternative procedure is shown in Fig. 2, where relatively thin laths 28 of at least 1/8 inch in thickness are fixed by nails 29 at intervals horizontally across the joists 30, except at the line of the desired joint. The two boards 20 are then nailed to the laths 28 with the exception of their adjacent horizontal edge portions, which are nailed directly to the joists 30. The depth of the recess so formed, and which is subsequently to be filled with plaster 25, is equal to the thickness of the laths.

A further alternative procedure is shown in Fig. 3 when laths 28 are fixed by means of nails 29 to the undersides of the joists 30 (only one joist being shown in Fig. 4). In the ceiling shown, two layers of scrim 26 are employed at the joint, this being frequently desirable as it confers additional strength or stability on the jointing plaster 25, and the ceiling boards are given a skim coat of plaster 27.

When perforated metal reinforcing strip or metal scrim is used, the strip or scrim may be impressed into a first layer of plaster as described in the preceding paragraph. The preferred procedure, however, is to nail the two adjacent plaster boards against the joists over the greater part of their area, to lay the metal strip or scrim along the junction to cover the gap, if any, and then to nail through the metal strip or scrim to fix the adjacent edge portions

to the portions of the joists underlying the joint, that is, portions either vee-notched or free from laths present elsewhere.

These procedures can be used in the construction of double-faced stud partitions by fixing boards 20 to both sides of timber studding 21, Fig. 4 showing a method analogous to that of Fig. 2 applied to such a partition.

One method of producing a vertical flush joint is shown in Fig. 5 where it is used in a double-faced partition. The "stud" underlying the joint consists of a batten 32 at least $\frac{1}{4}$ inch thinner than the studding 33 underlying the greater portion of the boards, so that bending back of the edges of the boards 20 occurs as before on nailing.

An alternative form of construction of vertical joints applicable to a double-faced partition is shown in Fig. 6 and includes horizontal timber filling pieces 34 inserted at intervals between the vertical studding 33 and secured by nails 35. If the filling pieces situated behind the line of a vertical joint are at least $\frac{1}{4}$ inch thinner than the neighbouring studding, they can be arranged to permit 1/8 inch bending back of adjacent vertical edges of pairs of boards 20 nailed to both sides of the studding.

As shown in Fig. 7, the method is equally applicable to metal studding, for example that sold under the trade name "Bam-A-Nail", which consists of two hollow end portions of generally horizontal section interconnected by a central web, the boards 20 being fixed thereto by non-return nails 49 driven through the sheet metal of the hollow end portions. The studs 48 underlying the joint are at least $\frac{1}{4}$ inch thinner than the studding 47 underlying the greater portion of the boards so that bending back of the edges of the boards 20 occurs as before on nailing down the edges with nails 50. In Fig. 6 the heads of the nails 49 and 50 are recessed and covered with plaster 51.

One form of interior wall surface to cover an underlying wall structure of brick, breeze blocks or other masonry, is shown in Fig. 8, where vertical battens 36 (only one of which appears in the Figure) are fixed to the face of the underlying wall structure 37, and building boards 20 such as plasterboard are fixed, usually by nailing, to the battens. The invention may be applied to this form of wall surface construction by the use of vee-notches (as in Fig. 7) or horizontal laths in the case of horizontal joints, or of appropriately placed battens of reduced thickness in the case of vertical joints. Metal channels can be used instead of timber battens.

An alternative mode of construction of a wall surface, especially suitable when the underlying wall structure has itself a very irregular surface, is shown in Fig. 9 and relies on the bonding of wall boards 20 to the underlying wall structure 37 by means of ribbons 38 or dabs of a thick gypsum plaster slurry. When flush-joints according to the invention are to be constructed in this type of wall, the edges of the boards may be bent and retained in the bent condition before application to the wall, since the bonding material is itself incapable of retaining the boards in the appropriately bent condition immediately after their application. The preferred procedure in this case, as shown in Fig. 9, is to score or groove each board from the back along the line 40 delimiting the extent of the bent-back edge portions, to bend back the edges of 1/8 inch or more as desired, and then to retain them in the bent position by application of a suitable fixative 41 to the back of the board at intervals or continuously along the scored or grooved line. Plaster slurry is a suitable fixative in the case of plasterboard. When the fixative has set, the boards with their edge portions bent back can be handled with confidence, and pressed into position against ribbons 38 of slurry previously applied to the underlying structure. When the slurry ribbons have hardened, the joints are completed by the application of a finely ground plaster slurry 25, or other jointing material preferably with the inclusion of narrow strips of reinforcing cotton bandage or scrim 26.

An alternative method of bending back the edges of the boards, where ribbons or dabs of thick plaster slurry are employed for fixing the boards to wall surfaces, is shown in Fig. 10 where a batten 39 or a series of nailing pads are fixed to the wall surface at a position immediately under the vertical joints, the batten or pads being of a thickness at least 1/8 inch less than the thickness of the plaster ribbons 38, and when the plaster ribbons have set hard the edges of the boards are bent back by nailing down to the underlying batten or pads 39. Alternatively, where the wall surface is substantially flat and true, ribbons or dabs of plaster of a thickness of at least 1/8 inch after the boards have been bedded to them can be applied to such wall surfaces and after the plaster ribbons have set hard the edges of the boards can be bent back by nailing directly into the wall surface using special nails designed for penetration in brick and other types of hard wall surfaces.

A further modification is shown in Fig. 11, where "battens" or pads formed of strips or pads of plasterboard 52 are fixed by means of thin layers of plaster slurry 53 to the surface of the wall 37. Boards 20 are fixed to the strips or pads 52 by further plaster 53 and when this has set the edge portions of the boards are bent back by direct nailing to the wall with the special nails 54 referred to above. Plaster slurry 55 can entirely bridge any space between the edges of the boards and the wall. In this modification the recess may be of a depth up to the thickness of the board.

Scoring or grooving of the board from the back thereof may be limited to the backing paper, but preferably extends some distance into the plaster itself (as shown in Fig. 9), and where a relatively high degree of bending is required scoring or grooving may be carried right through the plaster to the inner surface of the face paper. Deep scoring or grooving is especially useful when the lateral, cut, edges of boards are to be bent, in view of the greater resistance to extension of the face paper in its longitudinal direction . Scoring may take the form of mere cutting, for example with a plain, or serrated, rotary disc cutter, or may entail the grinding of a groove of applicable width. Scoring is facilitated if, after the initial cut through the backing paper, a little water is applied to the line of the cut. The water considerably reduces the strength of the portion of the plaster core to which it is applied, and subsequent cutting into the plaster layer is an easier and quicker operation.

When both horizontal and vertical flush joints are to be made round a single board, the corners of the board are preferably mitre-cut to permit satisfactory bending back of all its edges. The mitre-ends, however, should stop sufficiently short of the lines of bending on the face surface of the board to enable the cuts to be completely covered by the plaster or other jointing material when it is made flush with the face of the board.

When the invention is applied to the hollow partition members consisting of a pair of parallel facing boards 42 spaced by a cellular core 43 formed by intersecting edgewise strips, of the type referred to above, one method as shown in Figs. 12 and 13 is to provide a junction batten 44 extending longitudinally along the line of junction and between the inner faces of the two pairs of boards, the core being cut back within the edge portions of the partitions to accommodate the batten. The batten 44 can either be longitudinally vee-notched with a minimum thickness at the middle of the opposite notches of at least $\frac{1}{4}$ inch less than the spacing of the pair of boards in the partition member (as in Fig. 12), or can be rectangular in section with a thickness of at least $\frac{1}{4}$ inch less than the said spacing (as in Fig. 13). A disadvantage of this method is that it is difficult to get recesses of equal depth on the two sides of the partition.

The preferred method of jointing these hollow partition members is shown in Fig. 14 and uses short jointing members 45 extending transversely to the line of junction. The jointing members should at their extremities be a close fit between the pairs of boards 42, but of vee

or stepped profile, each side of the member having a recess of at least 1/8 inch in depth. The jointing members are inserted at intervals between the partition members 42 across the junction, the facing boards 42 are nailed to the members by means of nails 23 and 24, and the recesses so formed are filled with plaster and reinforcing scrim 26 in the same way as described above with reference to Figs. 1 to 3.

An alternative procedure with junction battens, whereby recesses of substantially equal depth can be obtained on both sides of the partition, is to insert between the facing boards of one of an adjacent pair of partition members centralising blocks at, say, two-feet centres, the blocks having inner ends fitting closely between the facing boards and outer ends tapering to allow for the bending back of the edge portions of the facing boards, and to nail the junction batten in a central position to the centralising blocks or alternatively to join the junction batten in a central position to the centralising blocks by means of mortise and tenon joints.

The claims defining the invention are as follows:-

1. A method of producing a joint between two adjacent substantially coplanar building boards, wherein an edge portion of each of the two boards is bent back from the plane of the face of the board and retained in the bent position, the edge being at least 1/8 inch behind the said plane, and, with the boards mounted in their coplanar position with the free edges of the bent portions parallel and adjacent the recess afforded by the bending back of the edge portions is filled with a hardenable jointing material bridging the gap if any between the said edges and forming a substantially plane surface across the joint. (29th April, 1960).

2. A method according to claim 1, wherein the jointing material is reinforced with at least one layer of cotton bandage, jute scrim or the like, perforated thin metal strip or other web material. (29th April, 1960).

3. A method according to claim 1 or 2 wherein a skin coat of plaster is applied to form a continuous plane surface of plaster with an increased depth of plaster over the joint. (29th April, 1960).

4. A method according to any one of the preceding claims wherein the boards are fixed to shaped supports which determine the profile of the mounted board, the bending being effected during the operation of fixing the boards in the coplanar position. (29th April, 1960).

5. A method according to any one of claims 1 to 3 wherein the boards are mounted by impression into ribbons of a hardenable bonding material such as gypsum plaster slurry, the edge portions being bent back before mounting and retained by the application to the boards of a hardenable fixative. (29th April, 1960).

6. A method according to any one of the preceding claims wherein the boards are scored or grooved at the back to facilitate bending. (29th April, 1960).

7. A method according to any one of the preceding claims wherein the jointing material is a slurry of gypsum plaster. (29th April, 1960).

8. A method of producing a joint substantially as hereinbefore described with reference to and as shown in any one of Figs. 1 to 11. (29th April, 1960).

9. A joint between adjacent building boards produced by a method according to any one of the preceding claims. (29th April, 1960).

10. A method of producing a joint substantially as hereinbefore described with reference to and as shown in any one of Figs. 12 to 14. (1st September, 1960).

11. A joint between adjacent building boards produced by a method according to Claim 10. (1st September, 1960).

CALLINAN & NEWTON.
Patent Attorneys for Applicant.

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Related Art:

Serial No.	Application No.	Classification.
204, 855	4882/54	81.3; 81.4
218, 514	12, 424/55	81.3
-	17, 382/28	81.3; 18.3.

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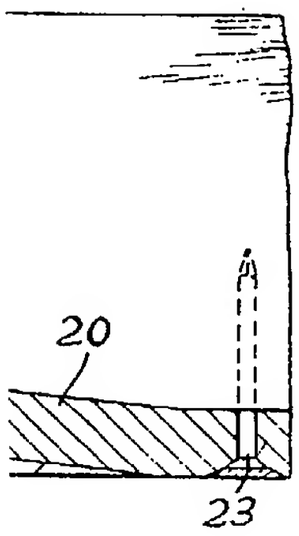


Fig. 3.

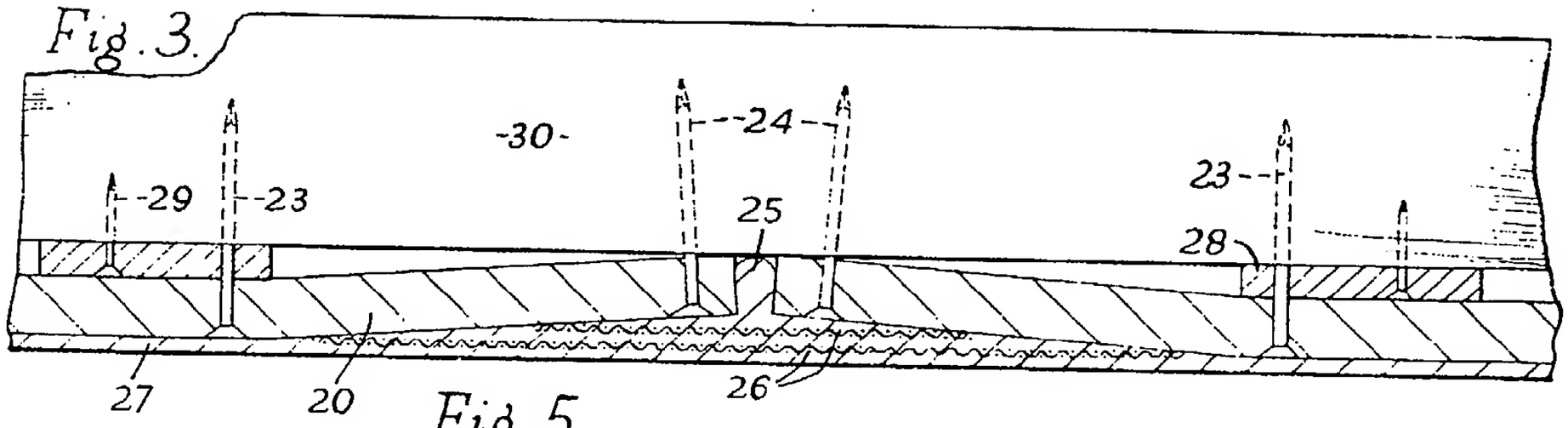
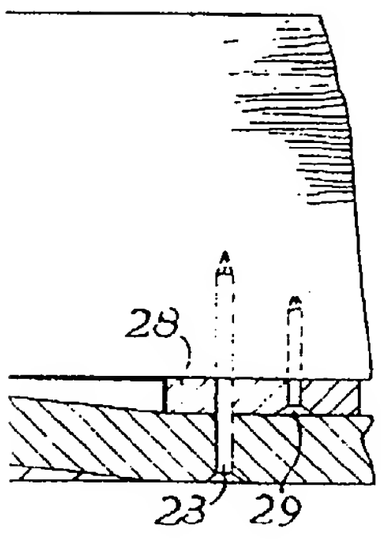
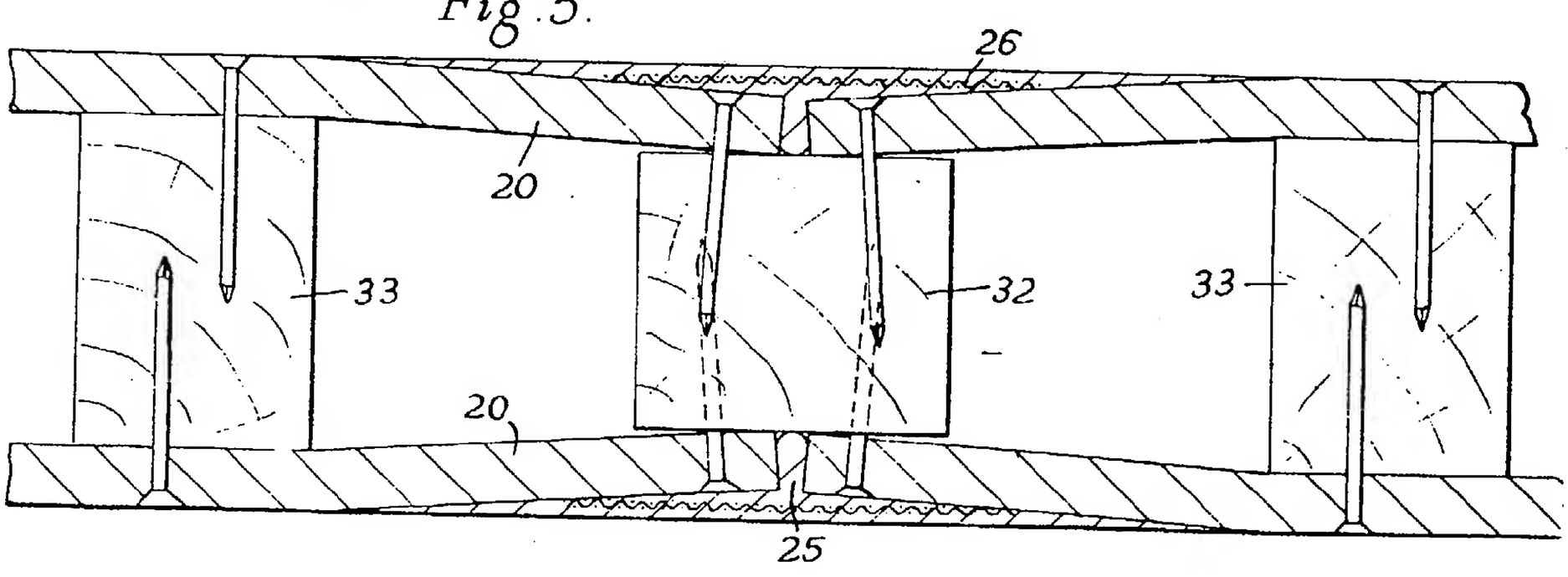


Fig. 5.





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ttorneys for Applicant.

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Fig. 1.

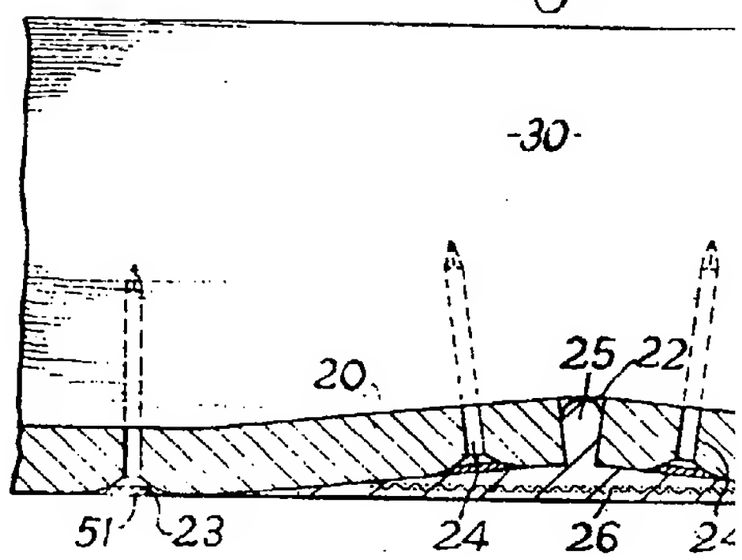
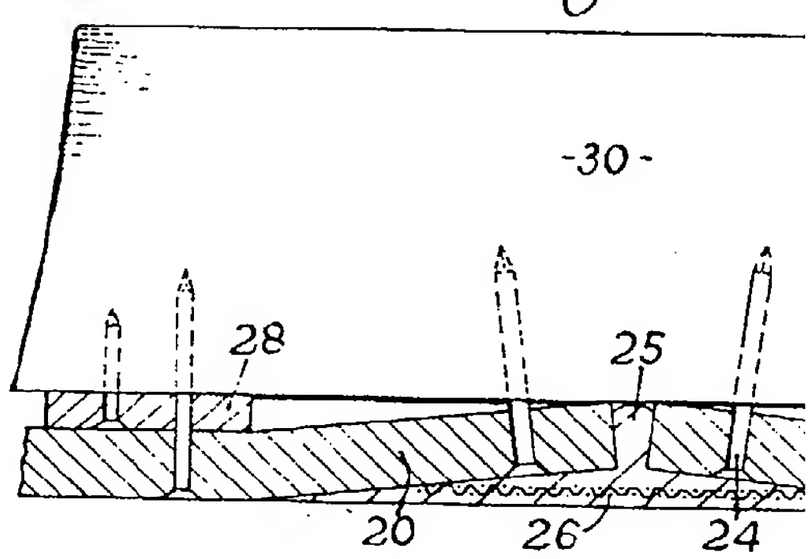


Fig. 2.



pplication No.	Classification.
4882/54	81.3; 81.4
2, 424/55	81.3
7, 382/28	81.3; 18.3.

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ttorneys for Applicant.

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Fig. 1.

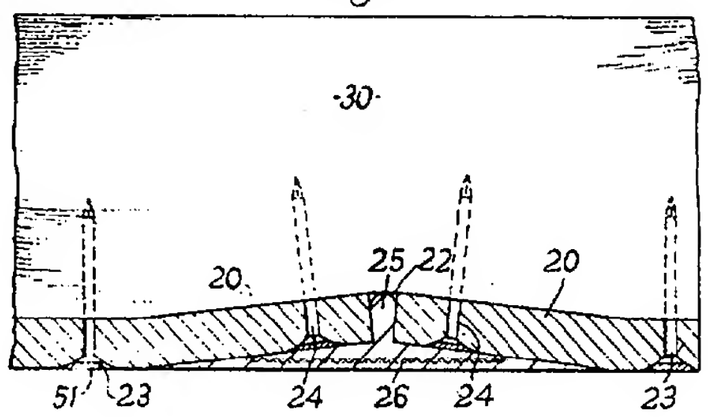


Fig. 2.

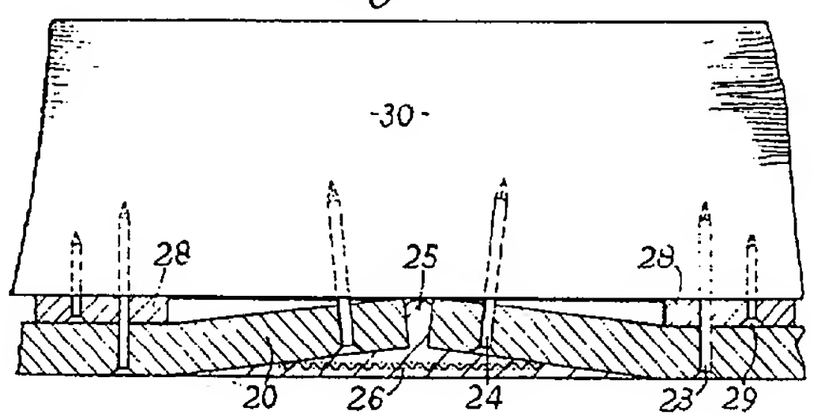


Fig. 3.

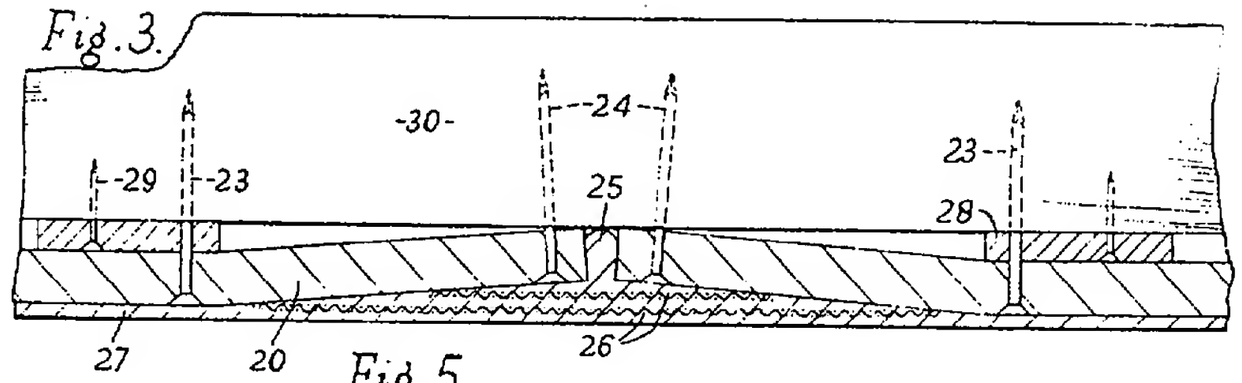
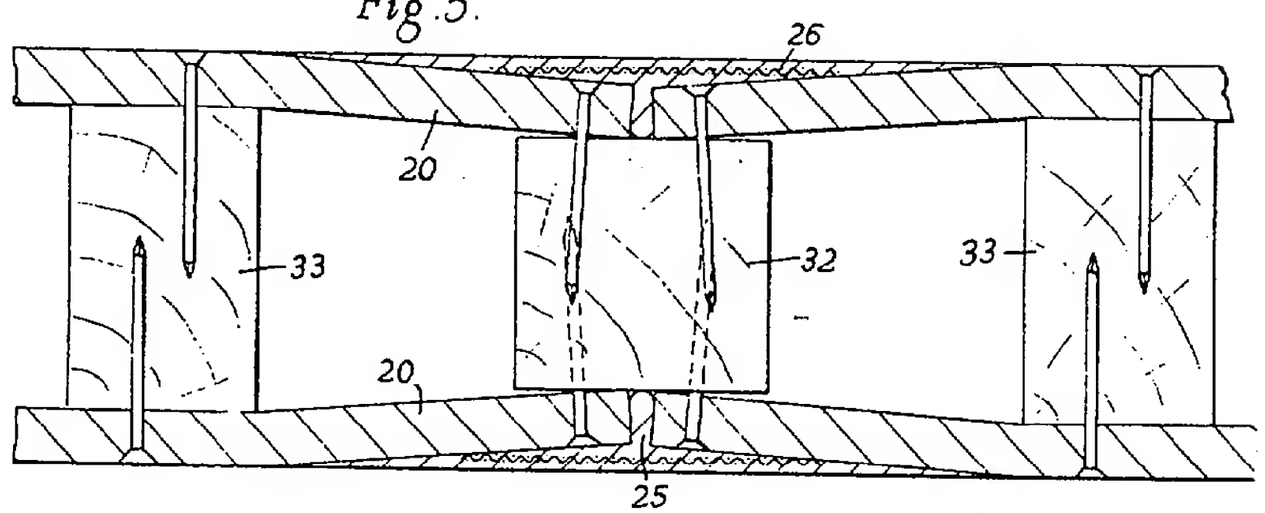


Fig. 5.



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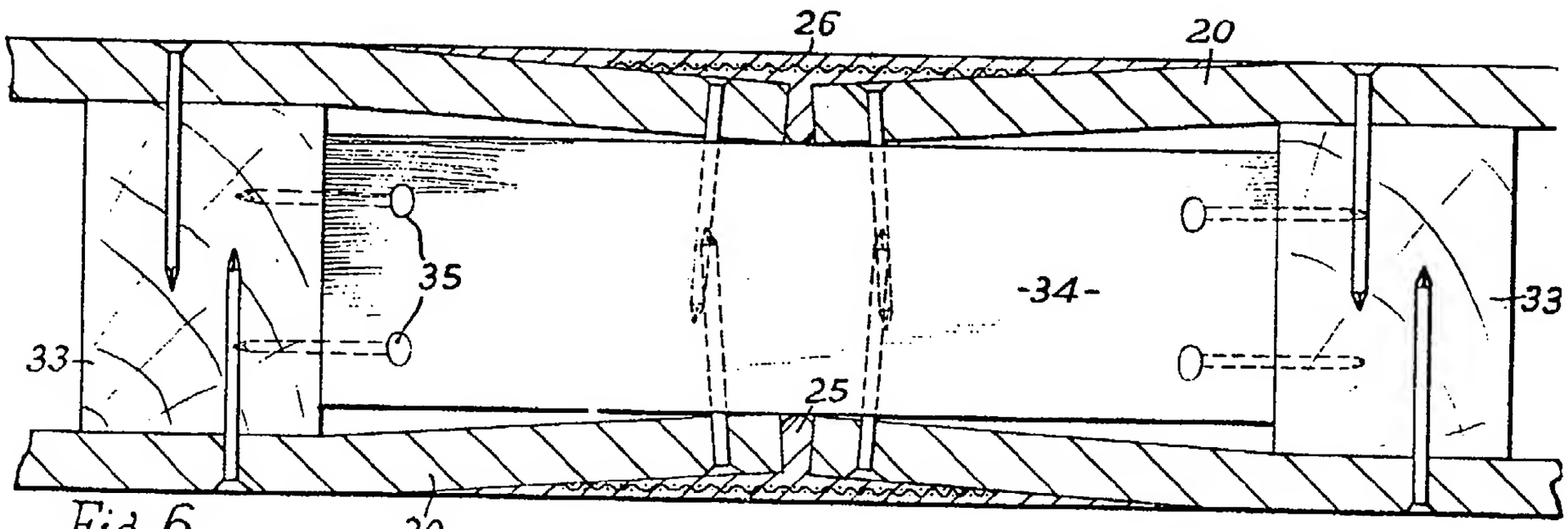


Fig. 6.

Fig. 14.

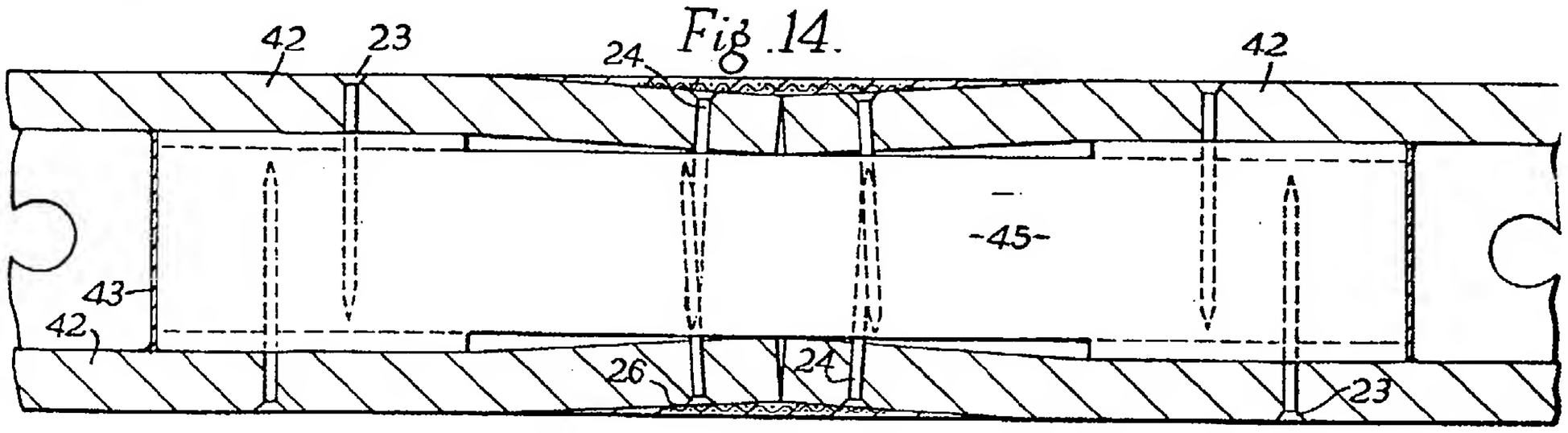


Fig.4.

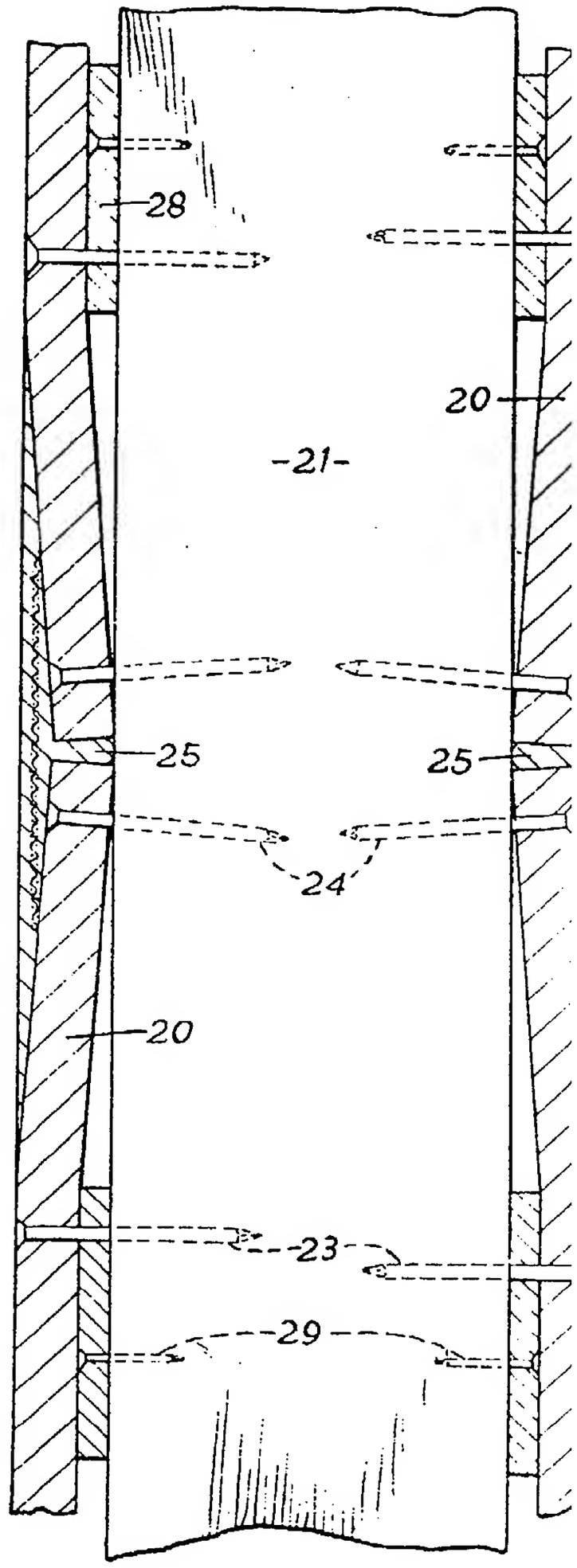
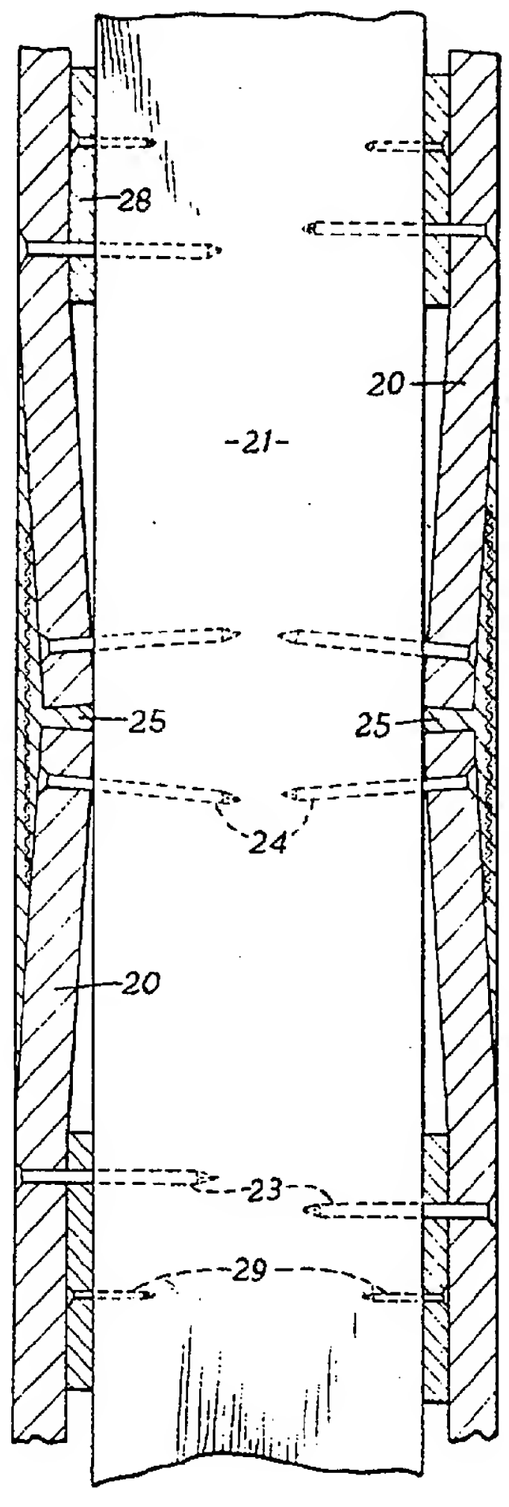


Fig.4.



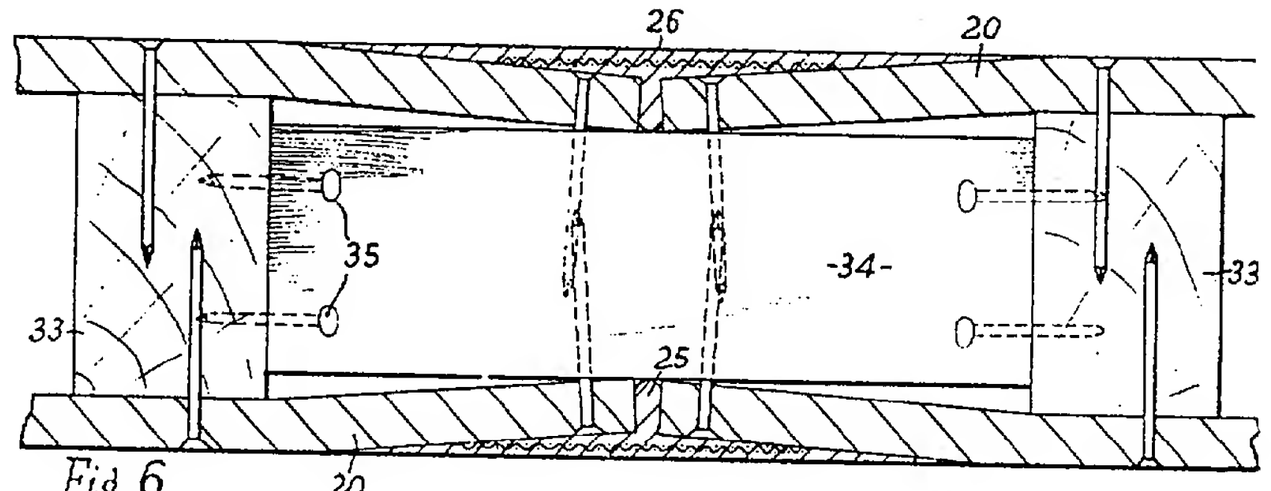
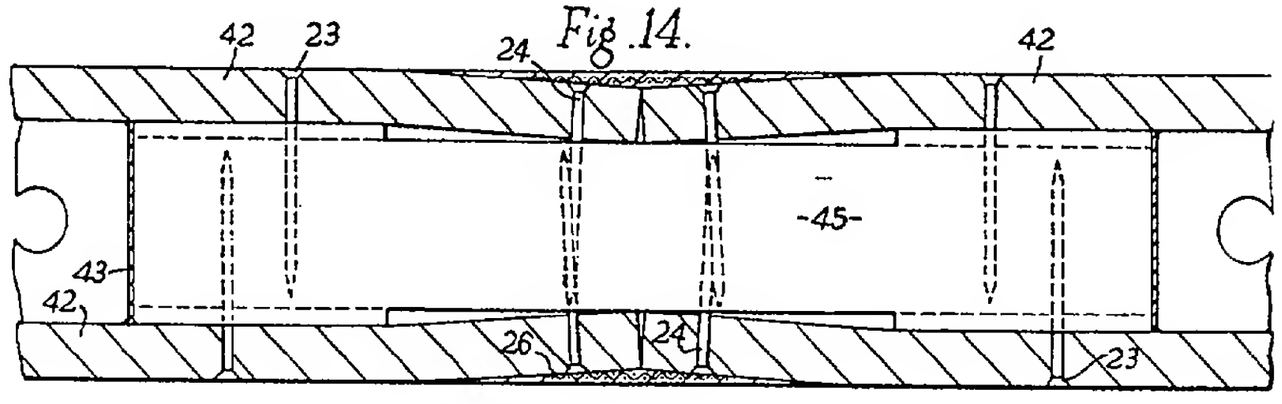
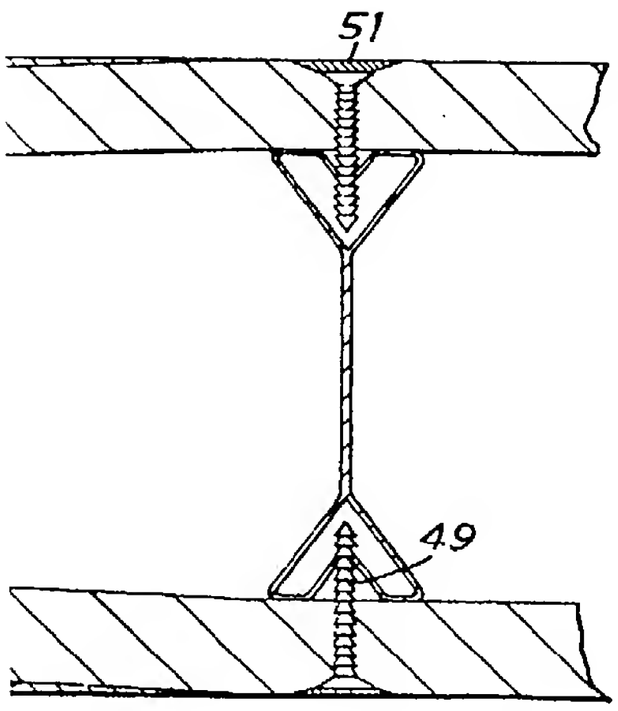


Fig.6.

Fig.14.





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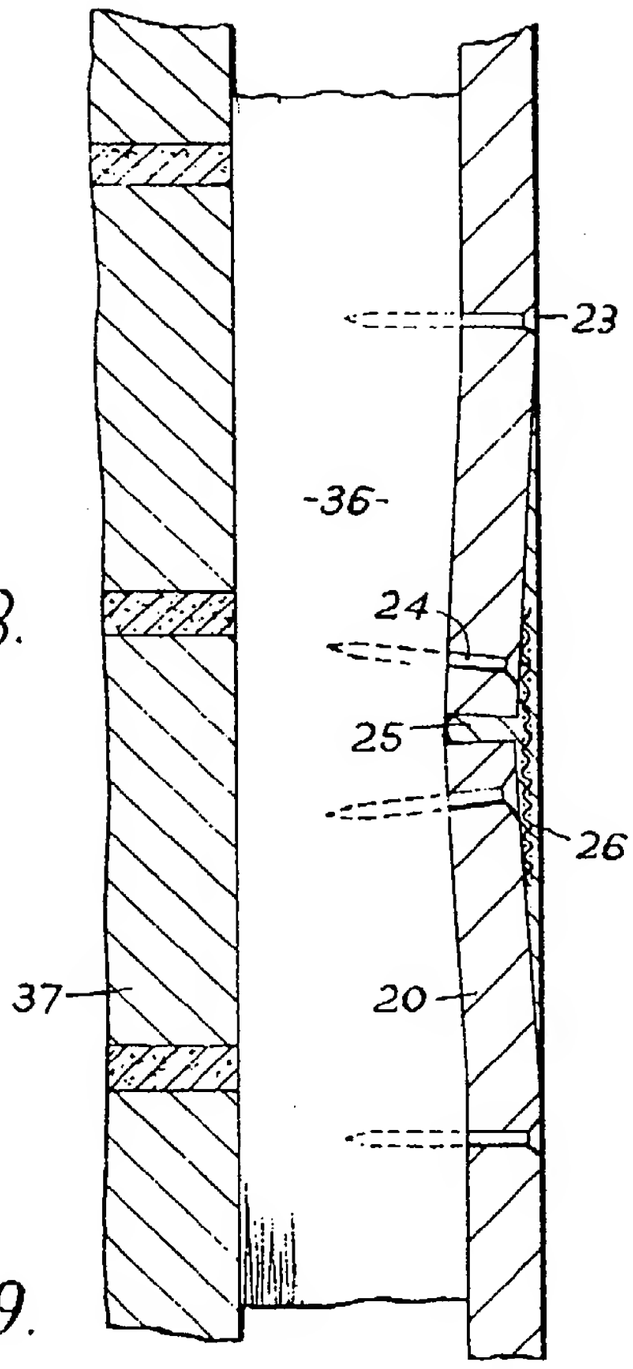

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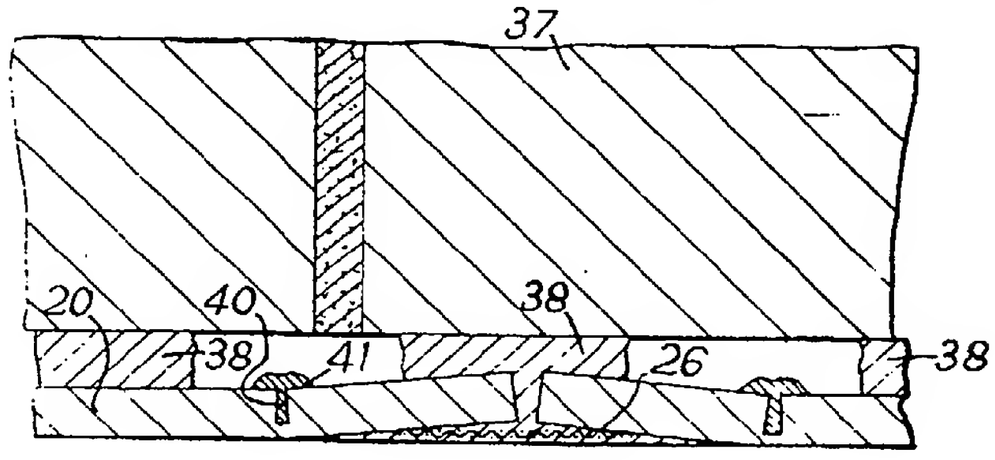

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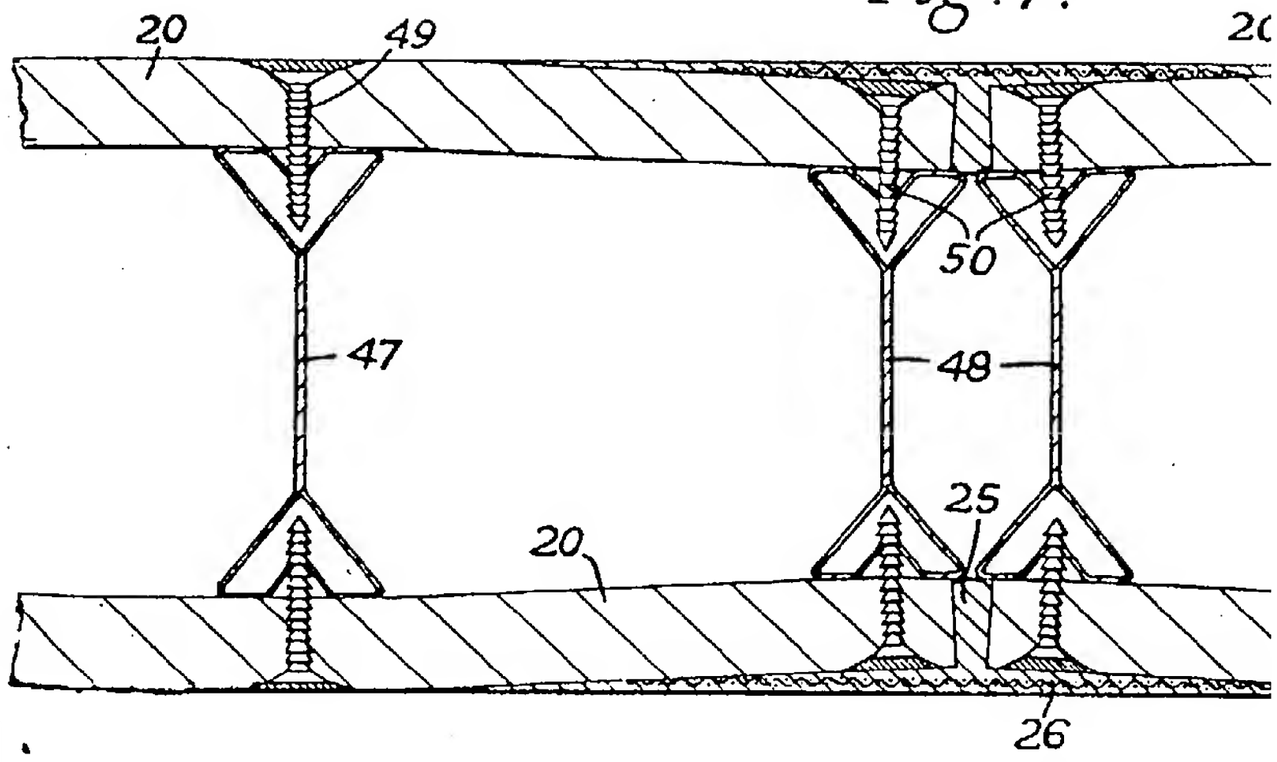


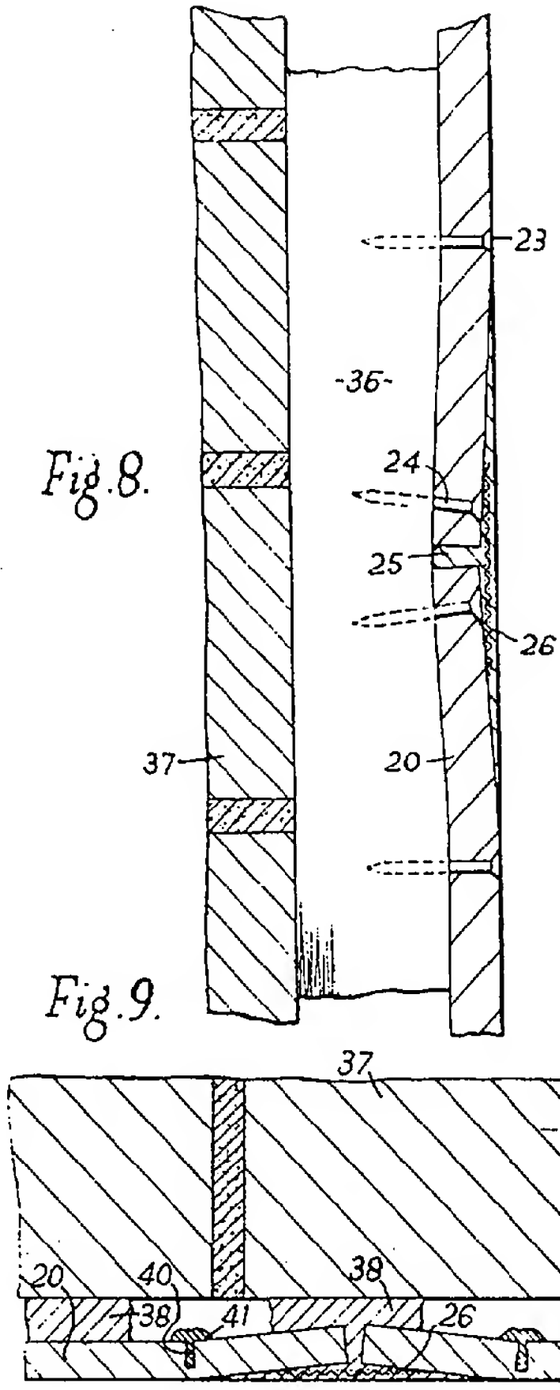
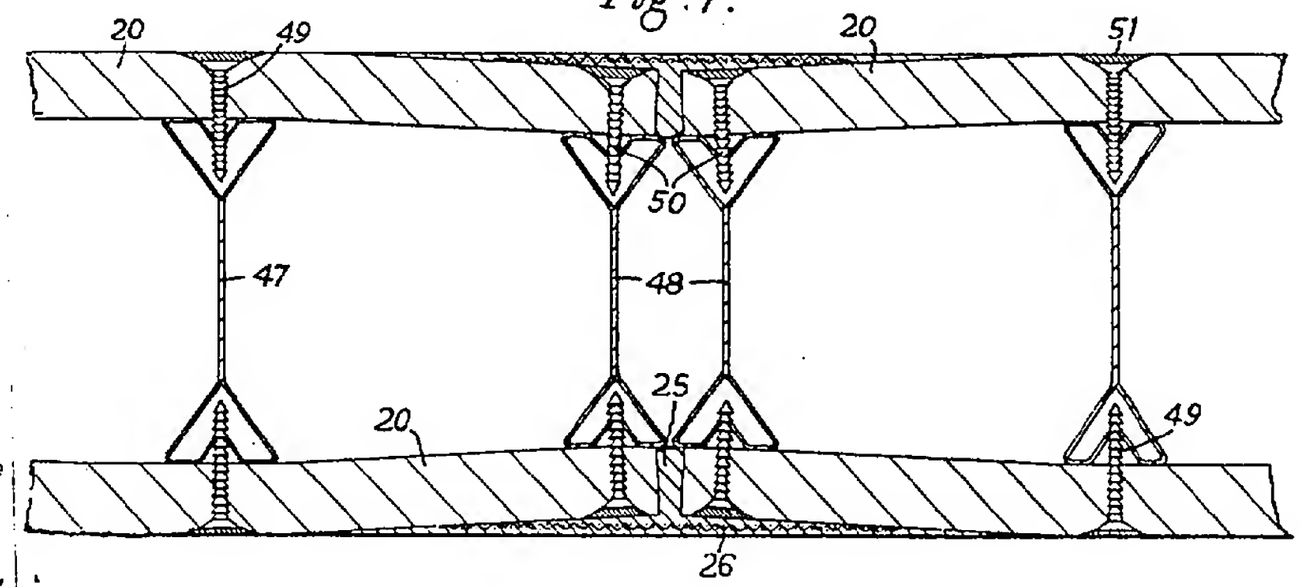
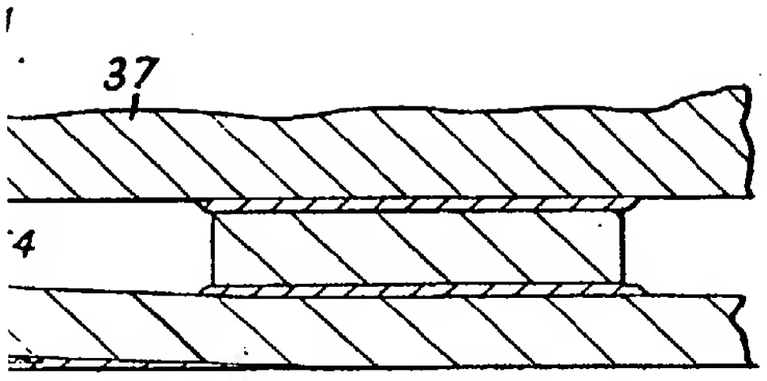


Fig.8.

Fig.9.

Fig.7.





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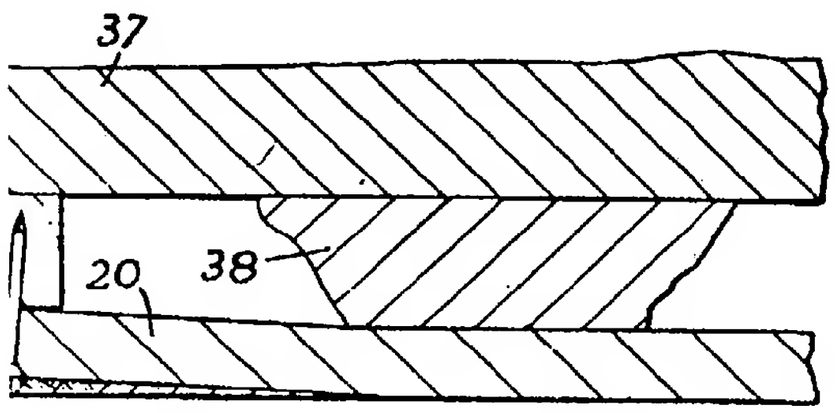
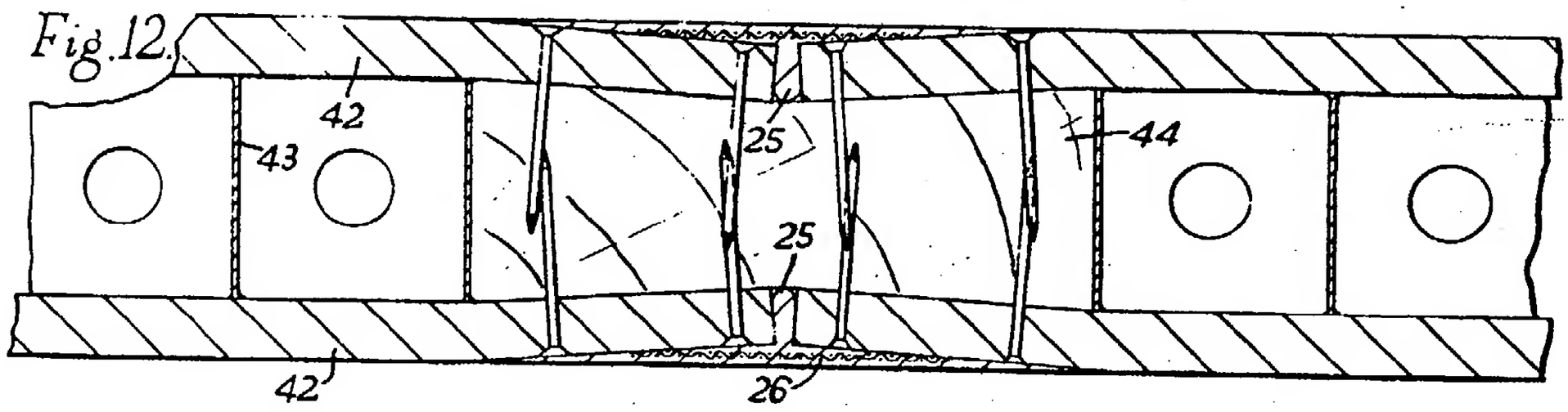


Fig. 12.



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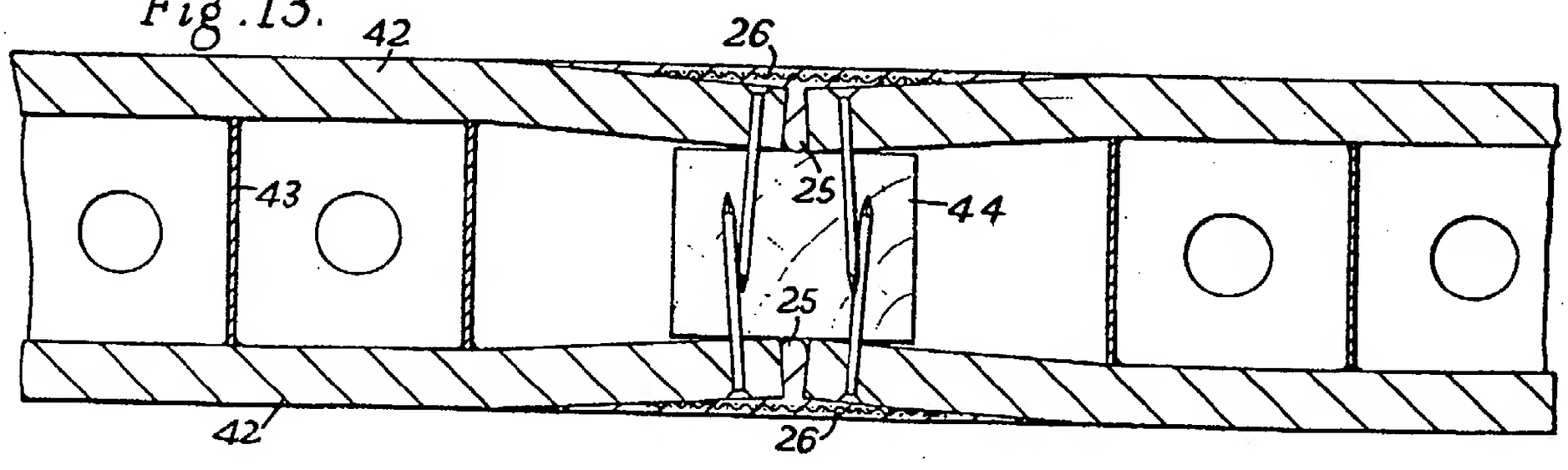


Fig .1

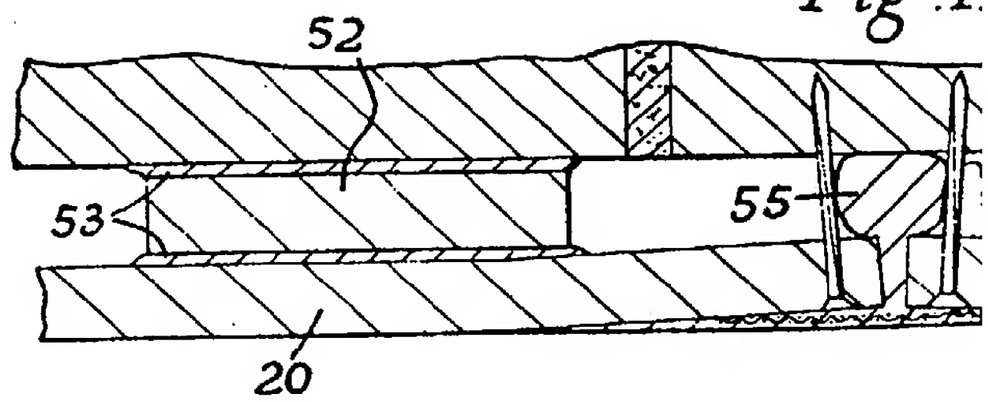
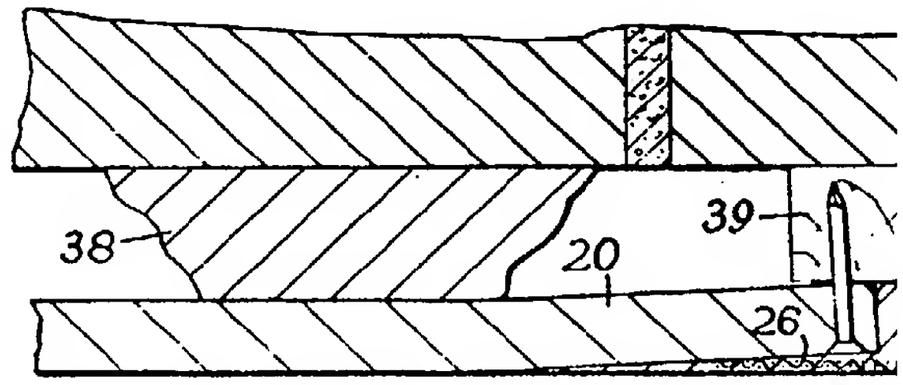


Fig .1



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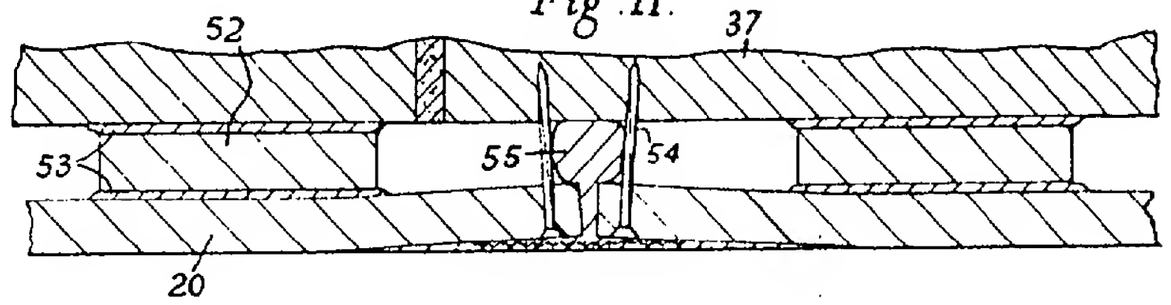

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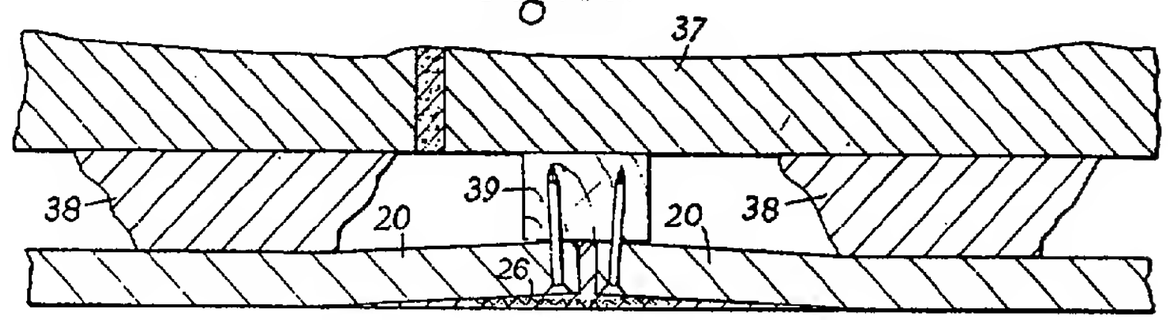

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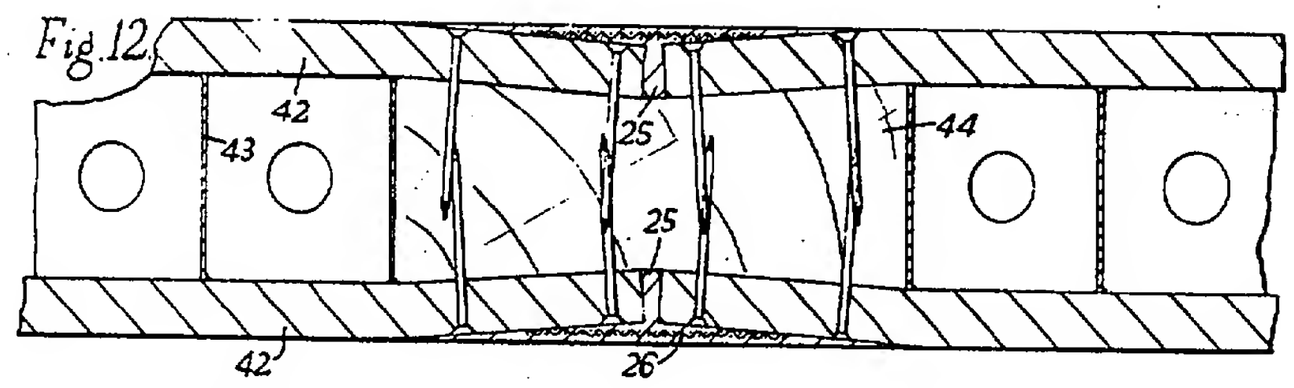

Fig. 13.